DAVTYAN, N. A.

Chemical composition of the fuel oils in Romashkino Region
petroleum. Trudy IGI 17:220-234 '62.   (MIRA 15:10)

(Petroleum as fuel)

D'YAKOVA, M.K.; DAVTYAN, N.A.; ZHAROVA, M.N.; AVRAMENKO, V.I.; KARANDASHEVA,V.M.

Obtaining solvents from naphthalene-containing industrial oils. Koks
i khim. no.10:40-43 '62.   (MIRA 16:9)

1. Institut goryuchikh iskopayemykh AN SSSR.
   (Coke industry—By-products) (Solvents)

DAVTYAN, M.A.

Activity cf aminotransferases in the heart muscle during
experimental myocarditis. Vop, biokhim. 3:107-113 '63.
(MIRA 17:12)

1. Institut biologicheskoy i meditsinskoy khimii AMN SSSR, Moskva.

DAVTYAN, N.A.; VASIL'YEV, S.F.

Investigating the liquid products of the oxidation pyrolysis of low-octane gasoline. Nefteper. i neftekhim. no.7:27-29 '64.

(MIRA 17:11)

1. Institut goryuchikh iskopayemykh AN SSSR.

YULIN, M.K.; VOL'-EPSHTEYN, A.B.; DAVTYAN, N.A.; LISYUTKINA, L.N.

Investigating the composition of the products of the alkylation of phenol with isobutyl alcohol and isobutene. Neftekhimiia 4 no.5:717-721 S-O '64.   (MIRA 18:1)

1. Institut goryuchikh iskopayemykh AN SSSR.

DAVTYAN, N.K.

Functional state of the adrenal cortex in the early stages of
experimental silicosis. Probl. endkok. 1 gorm. 6 no. 1:26-32
Ja-F '60.   (MIRA 14:1)
            (ADRENAL CORTEX)   (LUNGS—DUST DISEASES)

DAVTYAN, N.K.

Characteristics of the lipolytic activity of fatty tissue. Biul.
eksp.biol.i med. 54 no.11:63-64 N '62.   (MIRA 15:12)

1. Iz kafedry patologicheskoy fiziologii (zav. - prof. S.M.
Leytes) TSentral'nogo instituta usovershenstvovaniya vrachey
(dir. - M.D.Kovrigina), Moskva. Predstavlena deystvitel'nym
chlenom AMN SSSR A.V.Lebedinskim.
          (ADIPOSE TISSUES)   (LIPOLYSIS)

DAVTYAN, N.K.

Lipolytic activity of adipose tissue in experimental alloxan
diabetes. Biul. eksp. biol. i med. 55 /i.e. 56/ no.10:29-32
O'63   (MIRA 17:8)

1. Iz kafedry patologicheskoy fiziologii (zav. - prof. S.M.
Leytes) TSentral'nogo instituta usovershenstvovaniya vrachey,
Moskva. Predstavlena deystvitel'nym chlenom AMN SSSR V.V. Parinym.

DAVTYAN, N.K. (Moskva)

Lipopytic activity of fatty tissues in relation to their absorption of glucose following the direct action of some hormone factors. Probl. endok. i gorm. 9 no.6:33-38 N-D '63.

(MIRA 17:11)

1. Iz kafedry patologicheskoy fiziologii (zav. - prof. S.M. Leytes) TSentral'nogo instituta usovershenstvovaniya vrachey.

DAVTYAN, N.K.

Effect of some hormonal factors on the lipolytic activity of
the adipose tissue and on the serum content of non-esterified
(free) higher fatty acids under normal conditions and in
alloxan diabetes. Probl. endok. i gorm. 10 no.4:84-89 Jl-Ag '64.
(MIRA 18:6)

1. Kafedra patologicheskoy fiziologii (zav.- prof. S.M. Leytes)
TSentral'nogo instituta usovershenstvovaniya vrachey, Moskva.

LEYTES, S.M.; DAVTYAN, N.K.

Permissive role of glucocorticoids in the mobilization of fats
from the adipose tissue. Biul. eksp. biol. i med. 59 no.2:55-57
F '65.   (MIRA 18:7)

1. Kafedra patologicheskoy fiziologii (zav. - prof. S.M. Leytes)
TSentral'nogo instituta uscvershenstvovaniya vrachey, Moskva.

LEYTES, S.M.; DAVTYAN, N.K.

Effect of the absorption of glucose by adipose tissue on its lipolytic
activity under the influence of some hormones and experimental
diabetes. Vop.med.khim. 11 no.5:49-54 S-O '65.

(MIRA 19:1)

1. Kafedra patologicheskoy fiziologii TSentral'nogo instituta
usovershenstvovaniya vrachey, Moskva. Submitted May 6, 1964.

BABAYAN, A.T.; INDZHIKYAN, M.G.; DAVTYAN, N.M.

Alkaline cleavage of 1.2-diquaternary ammonium salts. Dokl. AN Arm.
SSR 35 no.4:173-176 '62.   (MIRA 17:1)

1. Institut organicheskoy khimii AN Armyanskoy SSR. 2. Chlen-korrespon-
dent AN Armyanskoy SSR (for Babayan).

BABAYAN, A.T.; INDZHIKYAN, M.G.; BAGDASARYAN, G.B.; DAVTYAN, N.M.

Amines and ammonium compounds. Part 22: Rearrangement-cleavage of ammonium salts containing -chloroethyl and allyl-type groups taking place under the effect of aqueous alkali. Zhur.ob.khim. 34 no.2:416-421 F '64.

(MIRA 17:3)

1. Institut organicheskoy khimii AN ArmSSR.

BABAYAN, A.T.; MARTIROSYAN, G.T.; INDZHIKYAN, M.G.; DAVTYAN, N.M.
MINASYAN, R.B.

Chemism of the mineralization process of organically combined
chlorine in the alkaline cleavage of quaternary ammonium salts.
Dokl. AN Arm. SSR 39 no. 2:99-106 '64.   (MIRA 17:9)

1. Chlen-korrespondent AN ArmSSR (for Babayan).

DAVTYAN, O. [Davtian, O.], prof.

Electrochemical power engineering. Nauka i zhyttia 12 no.3:26-29
Mr '63.
(MIRA 16:11)

1. PANCHENKOV, G.M., DAVTYAN, O. K.

2. USSR   (600)

"Research on the Dielectric Losses of the Mixtures Nitrobenzene-Benzene and Ethyl Alcohol-Benzene," Zhur. Fiz. Khim., 13, No. 5, 1939. Moscow, Petroleum Institute imeni Acad I. M. Gubkin, Lab of Physical and Colloidal Chemistry. Received 22 June 1938.

9. ▆▆ Report U-1613, 3 Jan 1952.

Complexity of electrical conductivity of electrolytes in an alternating electrical field. O. K. Davtyan. *Bull. acad. sci. U.R.S.S., Classe sci. tech.* 1943, 401-5.—Theoretical and math. The cond. of electrolytes for a.c. is not purely ohmic but contains also losses due to a relaxation period during the formation of an ionic atm. around a central ion.   S. Pakswer
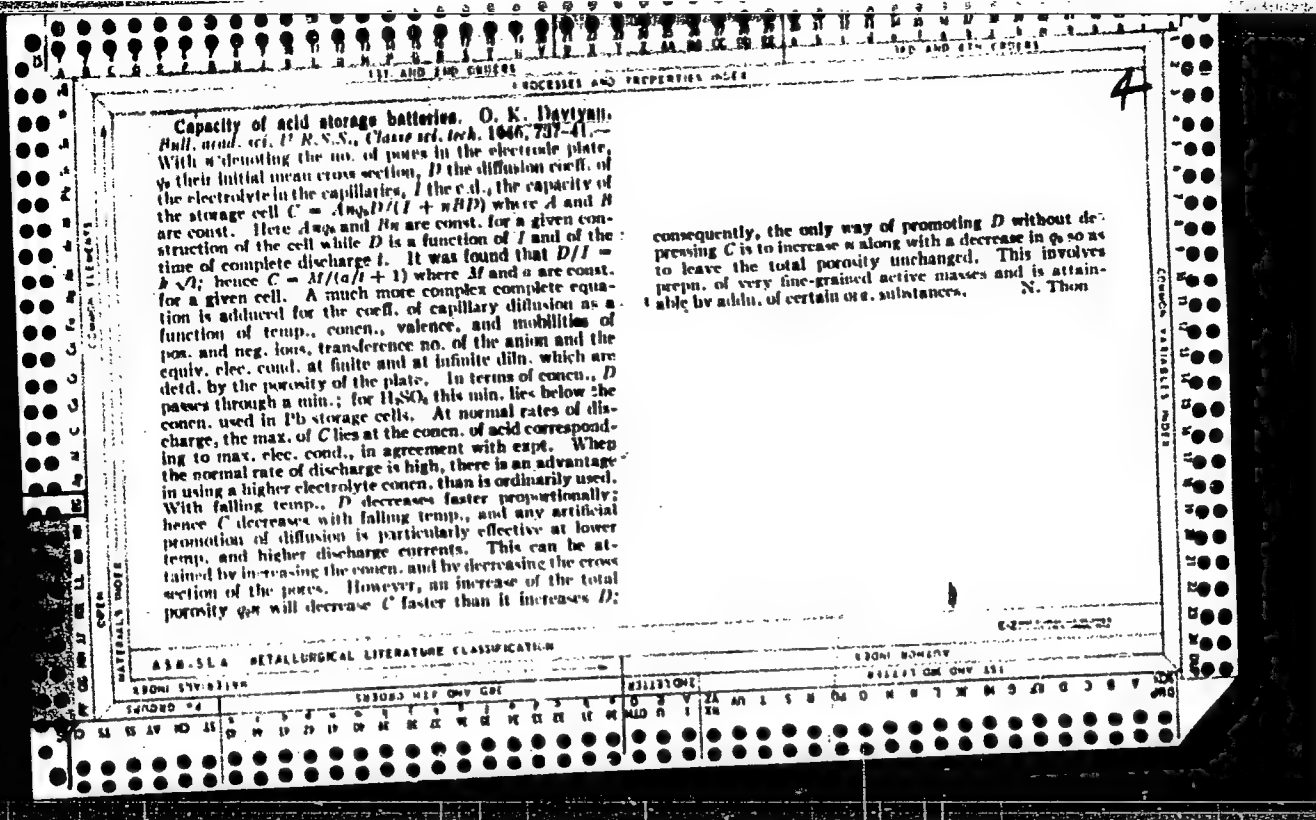
PROCESSES AND PROPERTIES INDEX

Investigation of solid electrolytes for gas cells. Ö. K. Dastyan (Energetichéskii Inst. Im. G. M. Krzhizhanov-skogo, Akad. Nauk S.S.S.R.). *Bull. acad. sci. U.R.S.S., Classe sci. tech.* 1946, 107-14.—A no. of mixts. were studied for their suitability as solid electrolytes for gas cells. Beside ionic cond. the electrolyte should have ceramic properties and be chemically resistant to the reacting gases and electrode carriers. The mixts. were made up of various proportions of Na_2CO_3, a Ural monazite sand contg. ThO_2 up to 3-4 and Ce-like earths up to 15-20%, Na glass, WO_3, CaO, quartz, and Chasov-Yar clay. The components were finely ground, mixed in desired proportions, pressed into small cylinders, and dried for 5 hrs. at 200°. After cooling, the ends of the cylinders were coated with a thin layer of graphite. The current was supplied through Pt plates pressed in at the ends of the cylinders. The cond. was measured with a Kohlrausch bridge. At room temp. the cond. of the specimens was practically zero. As the temp. increased (temps. studied up to 1200°) the cond. rose rapidly. These two facts point to ionic cond. The relation between temp. and cond. can be expressed by $s = Ae^{-B/T}$ where s is sp. cond. and A and B are consts. The results given by various mixes are tabulated.

M. Hosch

A.S.M.–S.L.A.   METALLURGICAL LITERATURE CLASSIFICATION

4

Capacity of acid storage batteries. O. K. Daviyan. Bull. acad. sci. U.R.S.S., Classe sci. tech. 1946, 737-41.— With n denoting the no. of pores in the electrode plate, q their initial mean cross section, D the diffusion coeff. of the electrolyte in the capillaries, I the c.d., the capacity of the storage cell $C = Anq_0 D/(I + nBD)$ where A and B are const. Here Anq_0 and Bn are const. for a given construction of the cell while D is a function of I and of the time of complete discharge t. It was found that $D/I = b\sqrt{t}$; hence $C = M/(a/t + 1)$ where M and a are const. for a given cell. A much more complex complete equation is adduced for the coeff. of capillary diffusion as a function of temp., concn., valence, and mobilities of pos. and neg. ions, transference no. of the anion and the equiv. elec. cond. at finite and at infinite diln. which are detd. by the porosity of the plate. In terms of concn., D passes through a min.; for H_2SO_4 this min. lies below the concn. used in Pb storage cells. At normal rates of discharge, the max. of C lies at the concn. of acid corresponding to max. elec. cond., in agreement with expt. When the normal rate of discharge is high, there is an advantage in using a higher electrolyte concn. than is ordinarily used. With falling temp., D decreases faster proportionally; hence C decreases with falling temp., and any artificial promotion of diffusion is particularly effective at lower temp. and higher discharge currents. This can be attained by increasing the concn. and by decreasing the cross section of the pores. However, an increase of the total porosity $q_0 n$ will decrease C faster than it increases D;

consequently, the only way of promoting D without depressing C is to increase n along with a decrease in q_0 so as to leave the total porosity unchanged. This involves prepn. of very fine-grained active masses and is attainable by addn. of certain org. substances. — N. Thon

DAVTYAN, O.K.

PROCESSES AND PROPERTIES INDEX

5/7

757

b

541.135.4 — 82 2292

A gas cell with a solid electrolyte. DAVTYAN, O. K.
Bull. Acad. Sci. URSS, Dep. Sci. Tech. (No. 2) 215–18
(1946) In Russian.—Diffusion of a suitable choice of
solid electrolyte, which must not be an electronic- or
mixed ion-electronic conductor, are discussed, and a
novel construction is described, using electrodes with
air and CO layers and meanings of ferromagnetic nature
as carriers. The solid electrolyte disc consists of a
mixture of Na_2CO_3, produced Monazite, WO_3, and special
glass. The preparation of this mixture is described, and
its properties are discussed in tables and by curves.
A drawing of the whole element assembly is also included.

A. L.

METALLURGICAL LITERATURE CLASSIFICATION

DAVTYAN, O.K.

'SA

541.133 : 537.311.3 — 92

PROCESSES AND PROPERTIES INDEX

1663

On the complexity of electric conductivity of electro-lytes in an alternating electric field. DAVTIAN, O. K. Bull. Acad. Sci. URSS, Dep. Sci. Tech. (No. 3) 401–8 (1946) In Russian.—The phenomenon of the ionic "cloud," its relaxation period and behaviour in a.c. fields are described. It is shown that the electrolytic con-ductivity is not due to pure resistance only, and that the losses appearing are comparable with Debye losses in polarised liquids. A full mathematical analysis is given.

A. L.

METALLURGICAL LITERATURE CLASSIFICATION

DAVIYAN, O. K.

G. M. Krzhizhanovskiy Energy Inst., Acad. Sci. USSR (-1946-)

"Diffusion Processes in real solutions of Electrolytes."

Iz. Ak. Nauk, Otdel Tekh. Nauk, No. 4, 1946

DAVTYAN, O. K.

G. M. Krzhizhanovskiy Energy Inst., Acad. Sci. SSSR, (-1946-)

"The Diffusion Potential of Real Solutions of Electrolytes."

Zhur. Fiz. Khim., No. 7, 1946.

2

PROCESS AND PROPERTIES INDEX

The dielectric behavior and electrostriction of solutions of electrolytes. O. K. Davtyan (Energetical Inst., Acad. Sci. U.S.S.R.) J. Phys. (U.S.S.R.) 10, No. 2, 183–90 (1946); J. Phys. Chem. (U.S.S.R.) 21, 315–34; Compt. rend. acad. sci. U.R.S.S. 49, 575–7(1945).—The relation between the dielec. const. and the electrostriction of solns. of electrolytes was investigated theoretically. The variation of the dielec. const. was found to be proportional to the electrostriction. The value of the electrostatic satn. depends on the square of the effective elec. field of the ions and also upon the external field. The dielec. const. of dild. solns. appears to be proportional to the concn. The proportionality coeff. characterises the amt. of electrostriction.

R. E. Whitcomb

METALLURGICAL LITERATURE CLASSIFICATION

DAVTYAN, O. K.

PA 18T75

USSR/Chemistry - Electrolytes
    Chemistry - Electrochemistry   Jun 1946

"The Diffusion of Electrolytes," O. K. Davtyan, 8 pp

"Zhur Fiz Khim" Vol XX, No 6

K Cl and NaCl were used as the electrolytes. Graphs
and tables of results accompany the article. The
theoretical dependence of the real solution of
electrolyte on the concentration of the electrolyte
areas is investigated.

18T75

19

Problema Neposredstvennogo Prevrashcheniya Khimicheskoi Energii Topliva v Elektricheskuyu. (The Problem of Direct Transformation of Chemical Energy of Fuel Into Electrical Energy.) O. K. Davtyan. 144 pages. 1947. Academy of Sciences of the USSR, Moscow and Leningrad.

Reviews theoretical bases of the fuel element, presenting thermodynamic calculations of free energy and electromotive force at different temperatures of the electrochemical cells H_2O_2, $C-O_2$, and $CO-O_2$. On the basis of these calculations, efficiency coefficients of fuel elements formed from such cells at different temperatures are derived. These considerations indicate possible ways to develop practical fuel elements, for direct transformation of coal and other fuels into electrical energy. 72 ref.

FRADKINA, E.M.; SHIROKOV, M.F.; YEL'TSIN, I.A.; DAVTYAN, O.K.

Concerning the papers by O.K.Davtian on the dielectric permeability and conductivity of electrolytes. Zhur.eksp. i teor.fiz. 17 no.4:375-376 '47.

(MLRA 6:7)

(Electrolytes--Conductivity) (Davtian, O.K.)

541.13 : 621.351

5372. Direct conversion of chemical energy of fuel into electrical energy. O. K. DAVTYAN. English Abstr. in *Rep. Brit. Elect. Res. Ass. (Ref. Z/Г76)* 18 pp. (1949) *In Russian.*

The importance of the fuel cell problem is discussed and a review of its history is given; an efficiency of 99·75% is claimed for a carbon-oxygen cell. Thermodynamic calculations for free energy and e.m.f. at various operating temperatures are given for the cells: hydrogen-oxygen, carbon-oxygen (1), (oxidation to CO), carbon-oxygen (2), (oxidation to CO_2), and carbon monoxide-oxygen. A connection is shown between the over-voltage of various metallic electrodes and their behaviour as gas electrodes. A hydrogen cell with air depolarization is described. Important advances are reported for fuel cells operating at room temperature with hydrogen, and, at high temperatures (550-900°), with producer gas as fuel. Difficulties attending the development of gas cells with solid electrolytes are discussed with examples of suitable substances on the basis of combinations of sodium carbonate, tungsten oxide, calcium oxide, quartz, etc.

M. M. HUDSON (a)

DAVTYAN, O. K.

Distr: 4E4c/4E3d

Mass spectrometer with an electrostatic lens. O. K.
Davtyan. _Sbornik Khim. Fak. Odess._ _Univ._ 4, 17-31
(1957), _Referat. Zhur., Khim._ 1958, Abstr. No. 16497.—
Theoretical data were worked out for the construction of a
mass spectrometer (MS) of small range and high resolving
power; the device is equipped with an electrostatic lens and
a sectorial magnetic field. The main disadvantage of exist-
ing MS is the length of travel for ions from the source to the
collector; this leads to a decrease in resolving power, owing
to the widening of the beam of ions under the influence of
the surrounding charge. In the construction described an
electrostatic lens is used to produce a parallel beam and a
sectorial magnetic field is used to cause dispersion with re-
spect to the mass. Focusing properties of such a system are
demonstrated theoretically and a method is given for calc.
the dispersion and the resolving power (disregarding aberra-
tions). With an inlet slot of 2 mm. and a radius of the cen-
tral track of 12 cm., the theoretical resolving power of the
designed MS is 1700, i.e. 10 times more than for a conven-
tional MS of a sectorial type and with a similar radius. In
this app. the traveling distance for the ions source to collec-
tor can be made very short and, in fact, it is limited by the
geometrical dimensions of the lens, the magnet, and the
collector.   J. Mloszewska

Illustr: 484

V Membrane method of hydrogenation of liquid organic materials. O. K. Davtyan. *Sbornik Khim. Fak. Odessk. Univ.* 4, 39- ; *Referat. Zhur., Khim.* 1956, Abstr. No. 17000.—The method is based on the use of a catalyst supported on a semipermeable partition between a gaseous and a liquid phase. To prep. the membranes, porous thin plates, e.g. glass filters, are immersed in a boiling soln. of $Ni(NO_3)_2$ and boiled 10-15 min. The plates are then dried and calcined until all $Ni(NO_3)_2$ is changed to NiO. The process is repeated several times, and the plates are treated for 1-2 hrs. in H at 240-60° to reduce NiO to Ni. Hydrogenations are carried on at 180-210°. Kinetics of the process are measured by detg. the I no. The advantage of the method is that the catalyst is not mixed with the org. material; thus neither pptn., filtration, nor purification of the reduced material is necessary. Consumption of the catalyst is very small. The membrane method makes possible a continuous hydrogenation process.   J. Minszewski

Davtyan, O K.

Chemisorption and the oxidation of sulfur dioxide on solid catalysts at room temperatures. U. K. Davtyan and E. N. Ovchinnikova. (I. I. Mechnikov State Univ., Odessa). Doklady Akad. Nauk S.S.S.R. 104, 857-60(1955).—D. proposed a hypothesis for SO_2 oxidation based on the A. A. Balandin multiplet theory or the Eyring complex-formation theory. The principal points of the hypothesis are: (1) Oxides (or hydroxides) are formed on the catalyst surface under definite conditions in contact with O (and water), which form no distinct phase on the catalyst surface, but are formed in the catalyst lattice. Their formation is accounted for by the fact that insufficient energy is liberated in the oxidation to cause oxide to sep. on the surface. (2) The catalysis consists in a phys. adsorption of the reacting mols. (SO_2) in the catalyst-O or catalyst-OH layer, to form an active complex that is relatively mobile along the reaction axis, and to form new intermediate surface compds. if the system energy is insufficient to remove them from the surface. Should the system energy be sufficient for this purpose, the final product of the heterogeneous catalysis is formed here. (3) At relatively low temps., the velocity of the process is not limited by the intermediate-compd. formation, but depends on process 2. Process 1 proceeds therefore at low temp. with sufficiently high velocity in comparison with process 2. (4) The intermediate compds.

L A V T Y A N   O.K.

USSR/Kinetics - Combustion. Explosions. Topochemistry. Catalysis.   B-9

Abs Jour : Referat Zhur - Khimiya, No 6, 1957, 18631

Author : Ye.N. Ovchinnikova. O.K. Davtyan.
Title : Oxidation of Sulfur Dioxide on Activated Carbon by Liquid Contact Method.

Orig Pub : Zh. fiz. khimii, 1956, 30, No 8, 1735-1738

Abstract : It is shown that oxidation of SO_2 takes place on the surface of activated carbon (I) at the adsorption of the mixture SO_2 O_2, as well as of SO_2 alone at indoor temperature and that the oxidation product can be washed off from the catalyst surface with water as H_2SO_4 (so-called liquid contact method) (RZhKhim, 1956, 32026). The superficial oxidized product dissociates at temperatures above $220°$ liberating SO_2 in gaseous phase. The amount of oxidized SO_2 rises together with the moisture in carbon up to a limit (0.25 g of H_2SO_4 per 1 g of carbon). The oxidation degree increases sharply, if I adsorbed O_2 and H_2O

- 268 -

Card 1/2

USSR/Kinetics - Combustion. Explosions. Topochemistry. Catalysis.   B-9

Abs Jour : Referat Zhur - Khimiya, No 6, 1957, 18631

simultaneously. It is assumed that in absence of H_2O, oxidation proceeds at the expense of superficial oxides on I. The speed of the liquid-contact formation of H_2SO_4 on I drops with the rise of concentration and, in case of a gas mixture of 20% of SO_2 and 80% of air, the formation discontinues at 40% of H_2SO_4 in the liquid phase, which is explained by diffusion difficulties. The initial speed of acid formation is proportional to the square root from the product of the partial pressures of SO_2 and O_2.

Card 2/2

- 269 -

15-57-5-6619

A Study of the Adsorption Properties of the Brown-Green Clays (Cont.)

clays were activated for two hours in 30 percent sulfuric acid or in ten percent hydrochloric acid. On testing with sunflower oil this material gives a discoloration factor 20 percent greater than that for the Zikeyevskiy tripoli. These results confirm the suitability of using the Odessa brown-green clays for purifying vegetable oils.

S. P. Sh.

Card 2/2

DAVTYAN, O. K.

Cascade theory of separation of binary mixtures and iso-
topes. O. K. Davtyan (State Univ., Odessa). Zhur.
Fiz. Khim. 31, 285-9(1957).—The same principles of the
ideal cascade sepn. of binary soln. components underlie
all the theories of the sepn. of binary mixts. by any phys.
means. In the ideal cascade sepn. the process cannot
proceed at points in which the entropy of mixing would
increase. The relation between the effective and the ideal
cascade sepn. coeffs., and a general equation of the cascade
stages at any increase in separation were derived. The
effects of natural diffusion upon the circulation flow are
discussed, and an equation of diffusional transfer was derived. A
general equation for the ideal cascade which is applicable
with any value of the partition coeff. and for any phys.
sepn. method, and which takes into consideration the
diffusional effect, was derived. The equation derived
by Cohen (C.A. 42, 7158h) is a special case of the derived
equation. The theory is equally applicable to sepn. of
binary mixts. and isotopes.   W. M. Sternberg

BURSHTEYN, S.I.; DAVTYAN, O.K.; TIKHONYUK, R.V.

Studying adsorptive capacity of Odessa brown-green clays.
Bent. gliny Ukr. no.2:128-135 '58.   (MIRA 12:12)

1.Odesskiy gosudarstvennyy universitet.
              (Odessa Province--Clay) (Adsorption)

AUTHOR: Davtyan, O. K.   ;   76-32-4-34/43

TITLE: The Elaboration of a New Method of Leak Detection in Vacuum
                  Systems and in High-Pressure Apparatus (Razrabotka novogo
                  metoda obnaruzheniya techi v vakuumnykh sistemakh i v appa-
                  raturakh vysokogo davleniya)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 4, pp. 935-
                  -936 (USSR)

ABSTRACT: The principle of the present method consists of the fact that
                  the hydrogen used as test gas is oxidized on a palladium ca-
                  talyst with oxygen and that the temperature rise is either
                  recorded by ignition, or by measuring with thermocouples. Be-
                  sides hydrogen also other compounds e.g. vapors of organic,
                  low boiling compounds can be used. For the determination of
                  leakages also a socalled indicator lamp can be constructed
                  which in principle consists of a glass bulb with a platinum
                  or palladium spiral. The platinum spiral has a diameter of
                  o.1 mm and a length of from 5-1o cm and the oxidation of
                  hydrogen is energetically carried out at a pressure above $1o^{-3}$
Card 1/2   torr, with the temperature of the wire strongly rising from

The Elaboration of a New Method of Leak Detection in   76-32-4-34/43
Vacuum Systems and in High-Pressure Apparatus

450 to 800°C. In vacuum determinations a thermocouple is used
in the indicator lamp, this is however, only rarely necessary.
The lamp practically operates without inertia. There are 6
references, 1 of which is Soviet.

ASSOCIATION: Odesskiy gosudarstvennyy universitet (Odessa State University)

SUBMITTED: June 1o, 1957

AVAILABLE: Library of Congress

1. Vacuum apparatus--Leak detection.   2. High pressure apparatus
--Leak detection   3. Hydrogen--Applications   4. Explosimeters
--Design

Card 2/2

DAVTYAN, O.K.; BURSHTEYN, S.I.

Adsorptive capacities of Odessa green clays and prospects for their industrial use. Bent.gliny Ukr. no.3:149-157 '59.

(MIRA 12:12)

1. Odesskiy gosudarstvennyy universitet.
(Odessa Province—Clay)

S/076/60/034/01/018/044
B008/B014

5 (4)
AUTHOR: Davtyan, O. K.

TITLE: Application of the Group Theory in Quantum Chemistry
            I. Simplification of the Method of the Group Theory

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol 34, Nr 1, pp 108-116
            (USSR)

ABSTRACT: In this article it is shown that it is theoretically possible
            to simplify the method of the group theory without reducing
            accuracy. Two methods used to symmetrize the initial eigen-
            function are discussed: one method makes use of the matrix
            properties, and the other is based on similarity transfor-
            mation. The essential features of the principle underlying
            the simplification of the group-theory method are the follow-
            ing: 1) The incomplete eigenfunction of the general system is
            invariant in its ground state with respect to transformations
            by operations of the symmetry groups of the respective mole-
            cule. 2) The quantum-mechanical electron-density distribution
            in the closed molecule shells has the same symmetry as the
            field of the core of the nucleus. 3) The best molecular orbit
Card 1/3 φ_i which is a linear combination of atomic orbits, can only

Application of the Group Theory in Quantum
Chemistry. I. Simplification of the Method of the
Group Theory

S/076/60/034/01/018/044
B008/B014

be real. 4) As the symmetry of the nuclear field is invariant
with respect to transformation operations of the symmetry
groups of the respective molecule, also the square of the
molecular orbit $\varphi_i 2$ must be invariant. On performing symmetry-
group operations on the molecule under consideration, the
above principles allow to obtain all possible identical ex-
pressions of the initial variation function. With the aid of
these identities all possible equalities of the variation-
function coefficients are determined. This leads in all cases
to a decrease in the secular determinant. In many cases one
obtains the same results by simplification of the secular
equation as by the application of the ordinary group-theory
method. To illustrate, the author calculates the energy of the
six mobile electrons of the benzene molecule both by the
localized electron pair and the molecular-orbital methods.
In both cases, the data obtained and the degree of simplifi-
cation of the secular equation do not differ from those re-
sulting from the application of the ordinary group-theory
method. The method suggested here does not fully replace the

Card 2/3

Application of the Group Theory in Quantum   S/076/60/034/01/018/044
Chemistry. I. Simplification of the Method of the   B008/B014
Group Theory

important group-theory method. It can be used only as one of
the applications of this method. There are 4 references, 2 of
which are Soviet.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I. Mechnikova
(Odessa State University imeni I. I. Mechnikov)

SUBMITTED: April 17, 1958

Card 3/3

DAVTYAN, O.K. (Odessa)

Application of group theory quantum chemistry. Part 2: Examples
of problems solved by a simplified group theory method.
Zhur. fiz. khim. 34 no.2:295-305 F '60.   (MIRA 14:7)

1. Odesskiy gosudarstvennvv universitet im. I.I.Mechnikova.
            (Quantum theory) (Groups, Theory of)

DAVTYAN, O.K.; MANAKIN, B.A.; MISIUK, P.C.

Temperature dependence of the rate of formation of sulfuric acid in the catalytic oxidation of sulfur dioxide on activated coal by the liquid-contact method. Nauch. ezhegod. Khim. fak. Od. un. no.2:113-115 '61.   (MIRA 17:8)

DAVTYAN, O.K.; OVCHINNIKOVA, Ye.N.; GRIGOR'YEVA, G.A.

Catalytic activity of platinated nickel as related to sulfur
dioxide oxidation. Nauch. ezhegod. Khim. fak. Od. un. no.2:
115-116 '61.   (MIRA 17:8)

DAVTYAN, O.K.; KUSKOVA, M.S.; MANAKIN, B.A.

Study of galvanic cells by means of hydrogen peroxide as a depolarizer. Nauch. ezhegod. Khim. fak. Od. un. no.2:117-120 '61.

(MIRA 17:8)

DAVTYAN, O.K.; IZMAYLOVA-RATUSHNAYA, D.N.; MANAKIN, B.A.

Study of an oxygen electrode on a chromium-nickel carrier.
Nauch. ezhegod. Khim. fak. Od. un. no.2:120-123 '61.
                                              (MIRA 17:8)

DAVTYAN, O.K.; BURSHTEYN, S.I.; RI BOK SUN

Filtering and absorptive properties of Odessa green clays.
Nauch. ezheged. Khim. fak. Od. un. no.2:123-125 '61.
(MIRA 17:8)

DAVTYAN, O.K.; OVCHINNIKOVA, Ye.N.; SOBOLEVA, N.M.

Interaction of carbon dioxide with finely dispersed calcium oxide in the presence of water vapors. Nauch. ezhegod. Khim. fak. Od. un. no.2:128-129 '61.

(MIRA 17:8)

DAVTYAN, O.K.; OVCHINNIKOVA, Ye.N.

Mechanism of oxidation, hydrogenation, and electrochemical combustion on solid catalysts. Part 1: Oxidation of sulfur dioxide on an activated carbon surface at 20°C in the presence of water vapor. Zhur. fiz. khim. 35 no. 4:713-718 Ap '61.   (MIRA 14:5)

1. Odesskiy gosudarstvennyy universitet im. I.I. Mechnikova, kafedra fizicheskoy khimii.
              (Sulfur dioxide)   (Oxidation)
                    (Carbon, Activated)

DAVTYAN, O.K.; TKACH, Yu.A.

Mechanism of oxidation, hydrogenation, and electrochemical combustion on solid catalysts. Part 2: Catalytic activity of surface "oxides" on carbon. Zhur. fiz. khim. 35 no.5:992-998
My '61.
(MIRA 16:7)

1. Odesskiy gosudarstvennyy universitet imeni Mechnikova, kafedra fizicheskoy khimii.
(Sulfur dioxide)   (Oxidation)   (Catalysis)

DAVTYAN, O.K.; MANAKIN, B.A.; MISYUK, E.G.; POLISHCHUK, Yu.N.

Mechanism of oxidation, hydrogenation, and electrochemical combustion on solid catalysts. Part 3: Relation between depolarizing oxides on carbon and platinum and the catalytic effect of the latter in the oxidation of SO_2. Zhur.fiz.khim. 35 no.6:1186-1191 Je '61.

(MIRA 14:7)

1. Odesskiy gosudarstvennyy universitet imeni I.I.Mechnikova, kafedra fizicheskoy khimii.
(Electrochemistry)   (Catalysts)

AUTHORS: Ovchinnikova, Ye. N., and Davtyan, O. K.

TITLE: Study of the mechanism of oxidation, hydrogenation, and
             electrochemical combustion on solid catalysts. IV. Low-
             temperature oxidation on platinum

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 9, 1961, 1907 - 1910

TEXT: The authors studied the oxidation of SO_2 on the surface of a
platinum catalyst. Method and apparatus had been described for the use
with activated carbon (Ref. 3: Zh. fiz. khimii, 35, 713, 1961). The
catalyst was produced by electrochemical precipitation of platinum black
from chloro platinic acid on a platinum wire net. The amount of precipi-
tated platinum black was determined gravimetrically, and the activity of
the catalyst was referred to 1 g of platinum black since the platinum net
had no activity under experimental conditions (20°C). The apparatus with
the net carrying the platinum black was evacuated. Cleaned air (140 mm
Hg) and SO_2 (340 mm Hg) were filled in. After a certain time, the gas

Card 1/3

Study of the mechanism...

S/076/61/035/009/001/015
B101/B110

was sucked off, the catalyst washed in boiling water, and the amount of resulting H_2SO_4 determined titrimetrically. The catalyst was found to become poisoned by repeated treatment with SO_2. In the first experiment, its activity was about 0.33 mmoles H_2SO_4/g, in the fourth one, only 0.1 mmoles/g. Control tests with chemically pure SO_2 produced from Na_2SO_3 proved that the SO_2 itself, and not any impurities, exerted the poisoning action. The degree of poisoning depends on the number of contacts between catalyst and SO_2, not on their duration. The experimental results are explained as follows: Oxidation of SO_2 is performed by oxygen chemosorbed on the active centers of the catalyst. The catalyst is poisoned by chemosorption of SO_2 molecules on the active centers; thus, these centers are exempt from oxidation. The following tests are mentioned as a proof: (a) The platinum catalyst was degasified in vacuo for 2 hr at 100°C, and subjected to the action of an SO_2 atmosphere for 2 hr at the same temperature. After cooling to 20°C, sucking-off of the SO_2, degasification of Card 2/3

Study of the mechanism...

S/076/61/035/009/001/015
B101/B110

the catalyst in vacuo, the catalyst had only an activity of 0.088 mmoles/g. Thus, the contact with SO_2 (without O_2) at 100°C produced a high degree of poisoning. (b) Two treatments of a freshly prepared catalyst with SO_2 (without O_2) reduced its activity to 1/10. A paper by O. K. Davtyan et al. (Zh. fiz. khimii, 35, 1186, 1961) is mentioned. There are 2 figures and 5 Soviet references.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I. Mechnikova
(Odessa State University imeni I. I. Mechnikov)

SUBMITTED: April 20, 1959

Card 3/3

DAVTYAN, O.K.

Calculation of absolute reaction rates. Zhur.fiz.khim. 35:
1944-1950 '61.   (MIRA 14:10)

1. Odesskiy gosudarstvennyy universitet imeni I.I. Mechnikova.
                (Chemical reaction, Rate of)

DAVTYAN, O.K. (Odessa)

Mechanism of oxidation, hydrogenation, and electrochemical
combustion on solid catalysts. Part 5: Origination of potentials
of hydrogen and oxygen electrodes and the dependence of the
potentials upon the degree of filling of active centers
of the catalyst surface. Zhur.fiz.khim. 35 no.11:2582-
2588 N '61.   (MIRA 14:12)

1. Odesskiy gosudarstvennyy universitet.
          (Catalysts)
          (Electrochemistry)

5.1190

31185
S/076/61/035/012/005/008
B138/B101

AUTHORS: ·Tkach, Yu. A., and Davtyan, O. K.

TITLE: Investigation of the mechanism of hydrogenation and electro-
             chemical combustion on solid catalysts. VI. Active centers
             and the appearance of the oxygen potential on carbon

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 12, 1961, 2727 - 2735

TEXT: Only the oxygen adsorbed by carbon, and which can readily be
evacuated in a vacuum at $20^{\circ}C$, is active in the catalytic oxidation of SO_2
at low temperatures (Ref. 1: Zh. fiz. khimii, 35, 992, 1961; Ref. 2: ibid;,
35, 1186, 1961). Only the active centers of the carbon participate (the
number of these has been calculated). In the chemisorption of O_2 on
carbon, the positive potential depends on the coverage of these active
centers. To explain these processes O. K. Davtyan (Ref. 3: Zh. fiz.
khimii, 35, 2582, 1961) made the following assumptions: 1) the chemical
and electrochemical activity of the catalyst electrode is dependent, not
on the total amount of chemisorbed substance, but on the amount adsorbed

Card 1/4

Investigation of the mechanism of...

31185
S/076/61/035/012/005/008
B138/B101

on the active centers; 2) surface migration, with the surmounting of the potential barrier, leads to mutual transfers between the particles chemisorbed on active and inactive centers. He derived the equation

$$\varepsilon = \varepsilon_0 - \frac{\varepsilon_0 - \varepsilon'}{\lg 2} \lg \frac{2Q_0}{Q_0 + Q} , \qquad (1)$$

showing the dependence of the electrode potential on the amount of material chemisorbed on active centers. ε = electrode potential at the coverage given, which corresponds to Q coulombs; ε_0 = maximum electrode potential in the solution; Q_0 = maximum amount of active substance chemisorbed at ε_0; ε' = potential where Q = 0. For the number of active centers as a function of maximum potential the equation

$$Q_0 = \frac{Q}{2 \cdot 10^{-0.301 \, \Delta\varepsilon/\Delta\varepsilon} - 1} , \qquad (2)$$

was derived, where $\Delta\varepsilon = \varepsilon_0 - \varepsilon$; $\Delta\varepsilon' = \varepsilon_0 - \varepsilon'$, on the basis of the curve in Fig. 10. These equations and assumptions were examined experimentally in this work. Transfer of chemisorbed O_2 from inactive to active centers was effected by the method described in Ref. 1. The carbon black electrode was heated in a vacuum

Card 2/4

Investigation of the mechanism of...

for 12 1/2 hrs at $600^\circ C$. The electrode was oxidized for 2 1/2 hrs with O_2 at $25^\circ C$ and atmospheric pressure, and the reaction vessel was filled with 31% H_2SO_4. After the cathode polarization current had been switched off the potential rose at a rate which increased with temperature. When the potential value had been restored and secondary cathodic polarization carried out, oxygen loss occurred, which also increased with temperature. In the first case it is assumed that there was O_2 migration from inactive to active centers, and in the second, in the opposited direction. When polarization was repeated, lower potential values always appeared, gradually eliminating the O_2 from the electrode. Anodic polarization at various current densities agreed with Davtyan's equation over a wide range. Using the second equation $Q_o = 131.64$ μcoulombs/cm^2 was found, which corresponds to $4.107 \cdot 10^{18}$ active centers per m^2 carbon black. The number of active centers was also determined by the amount of SO_3 formed during the low temperature oxidation of SO_2 on carbon (Ref. 1). Maximum adsorption was 0.5464 mmole/g, which corresponds to $O_2 = 107.60$ μcoulombs/cm^2.

Card 3/4

Investigation of the mechanism of...

31185
S/076/61/035/012/005/008
B138/B101

This makes the number of active centers $3.358 \cdot 10^{18}$ per m^2. There are 11 figures and 5 Soviet references.

ASSOCIATION: Odesskiy Gosudarstvennyy universitet im. I. I. Mechnikova
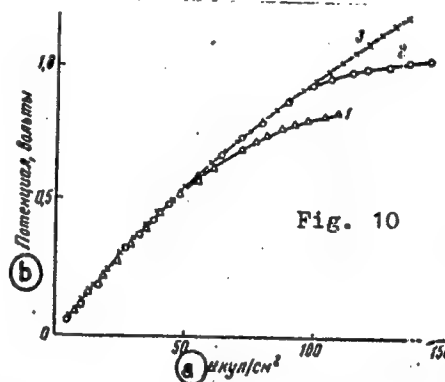(Odessa State University imeni I. I. Mechnikov)

SUBMITTED: April 4, 1960

Fig. 10. Curves for anodic polarization of the carbon black electrode at 0° C and different current densities.
(1) $1.06 \cdot 10^{-9}$ a/cm^2; (2) $1.41 \cdot 10^{-8}$ a/cm^2;
(3) calculated according to Eq. (1);
Legend: (a) μcoulomb/cm^2; (b) potential, v.

Fig. 10

Card 4/4

DAVTYAN, Oganes Karapetovich; NIKOLAYEV, L.A., red.; ALAVERDOV,
Ya.G., red. izd-va; VORONINA, R.K., tekhn. red.

[Quantum chemistry] Kvantovaia khimiia; kurs lektsii, pro-
chitannyi v Odesskom gosudarstvennom universitete. Moskva,
Vysshaia shkola, 1962. 782 p.   (MIRA 16:5)
                    (Quantum chemistry)

37072

S/076/62/036/004/001/012
B101/B110

.ſ.1190

AUTHORS: Davtyan, O. K., and Misyuk, E. G.

TITLE: Investigation of the mechanism of oxidation, hydrogenation and
              electrochemical burning on solid catalysts. VII. Problems of
              chemisorption. Formation mechanism of the hydrogen- and oxygen
              electrode potentials on platinized platinum

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 4, 1962, 673-680

TEXT: In a previous study (Zh. fiz. khimii, $\underline{35}$, 2582, 1961), the
following assumptions were made concerning the chemisorption of H_2 and O_2
on catalyst surfaces, as well as formation and change of the catalyst
(or electrode) potential depending on the occupancy of the active centers
(AC) by chemisorbed gas: (1) the electrode (or catalyst) surface is
energetically inhomogeneous. It has (differently intensive) AC, across
which all processes of chemisorption and desorption proceed. (2) The
occupation of the total surface of an electrode takes place by migration
of the chemisorbed gas from the AC to less active and inactive centers.
This process is reversible and tends towards a dynamic equilibrium.
Card 1/3

Investigation of the mechanism ...

S/076/62/036/004/001/012
B101/B110

(3) The change of the electrode potential, with change of the occupancy is based on concentration polarization. The number of occupied AC for a given potential is determined by the difference of the energy levels of the particles on the AC and in the solutions. For energetically varying AC the potential depends on the mean difference of the energy levels.
(4) On the basis of these assumptions, $\varepsilon = \varepsilon_o - \left[(\varepsilon_o - \varepsilon')/\log 2\right]\log\left[2Q/(Q_o + Q)\right]$
(1), was derived for the electrode potential ε. ε_o is the limit potential of the gas electrode; Q_o is the quantity of electricity corresponding to electrode saturated to a maximum with gas; Q is the amount of electricity for a certain amount of chemisorbed gas; ε is the potential corresponding to Q; ε' is the initial potential at the beginning of chemisorption. These assumptions were experimentally checked in the present study by means of a platinum-black platinized platinum wire electrode in KOH solution. I. A test of the H_2 migration on the electrode showed the following results: (a) Cathodic polarization of the electrode after the setting in of migration equilibrium was -0.76 v. Current was switched off after anodic polarization up to -0.137 v, and cathodic polarization only reached about 0.20 v. This could be repeated, and to each (lower) H_2 content of the electrode surface there corresponded a certain potential which
Card 2/3

Investigation of the mechanism ...

S/076/62/036/004/001/012
B101/B110

develops by migration of H_2 from inactive centers to AC. So far, this effect has been explained by diffusion. (b) The migration of H_2 from AC to inactive centers is seen from the fact that (at $100^{\circ}C$) cathode polarization up to -0.08 v and cut-off is followed by rapid approach of the potential to an equilibrium value about 0.03 v. (c) By "freezing" the migration at $0^{\circ}C$, a wide range (0 to -0.565 v) of agreement with the values calculated from Eq. (1) was found for $\mathcal{E}$. (d) The varying activity of the AC was proved by the dependence of the agreement between calculated and experimental $\mathcal{E}$ values on the initial occupancy. Since H_2 is first sorbed at the most active AC and then at the less active centers, migration sets in more easily at a high occupancy and thus also deviation of the experimental value from the calculated one. II. Chemisorption of O_2 produced similar results. O_2 migration is slower than that of H_2. III. The anodic polarization of Pt at $100^{\circ}C$ was found to lead to its partial oxidation: the number of AC decreases with increasing temperature. There are 7 figures.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I. Mechnikova
(Odessa State University imeni I. I. Mechnikov)
SUBMITTED: May 26, 1960
Card 3/3

42182
S/076/62/036/011/005/021
B101/B180

26.1610

AUTHORS: Tkach, Yu. A., and Davtyan, O. K. (Odessa).

TITLE: Mechanism of oxidation, hydrogenation and electrochemical combustion on solid catalysts. VIII. Migration kinetics of chemisorbed oxygen on a carbon electrode

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 11, 1962, 2374 - 2381

TEXT: Oxygen was adsorbed by anodic polarization at 0, 50, and 100°C, corresponding to 46.67 and 63.64 μcoulomb/cm^2 on a carbon black electrode degassed in vacuo at 600°C and electrochemically refined from oxygen at 100°C. The change in potential was plotted, due to oxygen migration from active to inactive centers after disconnecting the current. The values approached an equilibrium potential. At a total oxygen concentration of .46.67 μcoul/cm^2, this is 0.375 v at 0°C, 0.357 v at 50°C, and 0.335 v at 100°C. For an oxygen concentration of 63.64 μcoul/cm^2, the values are 0.505, 0.481, and 0.454 v, respectively. Based on the law of mass action and on formal kinetics, calculation of the oxygen migration velocity from

Card 1/2

Mechanism of oxidation...

S/076/62/036/011/005/021
B101/B180

active to inactive centers, and vice versa gives oxygen concentration curves which do not agree with experimental data. On the other hand, the experimental curves are used to determine the equilibrium constants k_1 and k_2 for direct and inverse migration; and, using of the Van't Hoff and Arrhenius equation, it was found that log k was a linear function of $1/T$ greatly inclined toward the axis of abscissas. Hence, the activation energy is calculated as $E_1 = 716.81$ cal/mole for direct and $E_2 = 2833.02$ cal/mole for inverse migration. The passage of chemisorbed particles from active to inactive centers, and vice versa must thus occur by surface migration, a definite potential barrier being surmounted. There are 5 figures and 4 tables.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I. Mechnikova
(Odessa State University imeni I. I. Mechnikov)

SUBMITTED: May 21, 1961

Card 2/2

O.K. Davtyan

Mechanism and Kinetics of Current Producing Processes in the Electrochemical
Oxydation of Gases

Report presented at the 14th meeting CITCE, Intl. Comm. of Elecrochemical
Thermodynamics and Kinetics, Moscow, 19-25 Aug 63.

Odessa University, Odessa, U.S.S.R.

DAVTYAN, O. K.

"Mechanism and Kinetics of Current Producing Processes in the Electro-
chemical Oxidation of Gases.":

Report presented at the 14th Annual Meeting of the International Committee
on Electrochemical Thermodynamics and Kinetics (CITCE), Moscow, 19-25 Aug 63.

AM4008920   BOOK EXPLOITATION   S/.

Davtyan, Oganes Karapetovich

Quantum chemistry; lectures delivered at Odessa State University (Kvantovaya
    khimiya; kurs lektsiy, prochitanyy v Odesskom gosudarstvennom universitete)
    Moscow, "Vy"shaya shkola", 63. 0782 p. illus., biblio., index. Errata slip
    inserted. 5,000 copies printed.

TOPIC TAGS: quantum chemistry, quantum theory, quantum statistics, chemical bond,
intermolecular interaction, molecular orbital method, chemical reaction, reaction
ability, reaction rate

PURPOSE AND COVERAGE: The book is based on a lecture course delivered by the
author in the physical chemistry department of the Odesskiy gosudarstvenny"y
universitet (Odessa State University) and contains extensive systematized mathe-
matical and quantum-mechanical material necessary for the understanding of the
principles of quantum chemistry. Many of the methods used in quantum chemistry
are explained in detail and are illustrated by numerous examples. These include
the Hartree-Fok method, the Heitler-London method, the method of molecular orbitals
and methods of valent bonds. The purpose of the book is to acquaint a large circle
of chemists and physicists with modern quantum-chemical computation methods, and

Card   1/3

AM4008920

is intended for independent study. The author thanks Academician N. N. Boglyubov and Professors V. M. Tatevskiy and L. A. Nikolayev for reviewing the manuscript, critical remarks, and for valuable advice.

TABLE OF CONTENTS [abridged]:

Card 2/3

AM4008920

SUB CODE: CH

OTHER: 216

SUBMITTED: 23Aug62

DATE ACQ: 29Jul63

NR REF SOV: 037

Card 3/3

L 18872-63   EWG(k)/BDS   AFFTC/ASD   Pz-4   RH

ACCESSION NR: AP3006612   S/0076/63/037/009/1949/1957

AUTHOR: Davtyan, O. K.

TITLE: Aspects of the recent status of fuel cells

SOURCE: Zh. fizicheskoy khimii, 37, no. 9, 1963, 1949-1957

TOPIC TAGS: fuel cell, electrochemical energy, thermal energy, automobile battery, automobile engine, gaseous fuel, photolysis

ABSTRACT: The main advantage of electrochemical energy over Thermal energy is due to the high efficiency of fuel cells. This has been concluded not only from thermo-dynamic relationships but also has been proven under actual working conditions. Fuel cells also offer other advantages such as simplicity of design and absence of movable parts and noxious gases. They are considered to be ideally suited for various means of transportation, particularly for cars because fuel cells are not affected by short-circuiting which is extremely important in starting Also in temporary stopping a fuel cell battery will hardly use any fuel, whereas thermal conversion engines consume fuel even at idling speed. Thus fuel cell batteries will probably find use in cars and railroad engines. Fuel cells can

Card 1/2

L 18872-63

ACCESSION NR: AP3006612

replace storage batteries as source of direct current in electroplating, refining of source metals, etc. Hydrogen-oxygen batteries could be used in production of hydrogen isotopes. The author, who has been actively engaged in research on fuel cells since 1938, feels that most prominent fuels will be gases and liquids because coal will be limited exclusively to serve as raw material in chemical industry. Gaseous fuels will be available as by-products of coke and petroleum idustries and by reprocessing of natural gas. Hydrogen will be obtained from electrolysis of water with energy supplied by solar batteries or directly by the sun (photolysis). Water power, atomic power and wind power could also supply energy for the manufacture of hydrogen. Consequently, electrochemical energy will because the primary source of power in future transportation, and eventually will be combined with atomic and solar energy. Orig. art. has: 1 table.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I. Mechnikova (Odessa State University).

SUBMITTED: 19May61   DATE ACQ: 30Sep63   ENCL: 00

SUB CODE: CH   NO REF SOV: 017   OTHER: 015

Card 2/2

ACCESSION NR: AP4034572   s/0076/64/038/004/0825/0832

AUTHOR: Davtyan, O. K. (Odessa)

TITLE: Study of oxidation, hydrogenation and electrochemical combustion on solid catalysts. IX Functioning of membrane electrodes (membrane type catalysts) in the electrochemical combustion of gases and in other homogeneous processes

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 4, 1964, 825-832

TOPIC TAGS: membrane electrode, electrode, catalyst, surface catalysis, fuel cell, cell, heterogenious catalysis, catalysis, electrochemistry

ABSTRACT: One of the bases for the construction of gaseous elements and, consequently, the electrodes is that reacting gases and the electrolyte must have a free access to the surface of the catalyst or the electrodes in order to form an active contact of three phases: gas-catalyst-electrolyte. This article considered two methods of forming an active three phase boundary; which are (1) hydrophobization of the electrode and (2) formation of pressure drop between the reacting gases and the electrolyte. The hydrophobization of the electrode must be carried out in such a way that the electrode acquires a definite wetability gradient; the

Card 1/2

ACCESSION NR: AP4034572

greatest concentration of hydrophobic substance must be on the gas side of the
electrode. Investigation is made of the mechanisms of successive stages of current
producing processes such as chemisorption of gas, migration of chemisorbed
particles to the active sections of the three phase boundary and ionization of the
chemisorbed particles. A precise definition is given for the three-phase active
boundary concept. The reaction conditions considered are for functioning of the
membrane type catalyst as fuel-cell electrodes with liquid electrolyte. These
are applicable to any heterogeneous catalysis reactions in which the reactant is
both in the gaseous and in the liquid phase. Orig. art. has: 3 figures.

ASSOCIATION: Odeskiy Gosudarstvennyy Universitet (Odessa State University)

SUBMITTED: 19May62   DATE ACQ: 20May64   ENCL: 00

SUB CODE: GC, FP   NO REF SOV: 005   OTHER: 002

Card   2/2

ACCESSION NR: AP4039614   S/0076/64/038/005/1077/1083

AUTHOR: Davtyan, O. K. (Odessa)

TITLE: Study of the mechanism of oxidation, hydrogenation, and electrochemical combustion on solid catalysts. X. The oxygen electrode

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 5, 1964, 1077-1083

TOPIC TAGS: electrochemical oxidation, oxygen electrode, oxidation catalyst, metal oxide catalyst, $MOLi_2O$ catalyst, oxygen chemisorption, oxide electrical conductivity

ABSTRACT: A theoretical study of the chemisorption of oxygen on a catalyst surface has been presented as the principal approach to the selection of catalyst-carriers for oxygen electrodes with predictable electrochemical activity. The metal oxides NiO, CoO, CuO, MnO, etc., and solid solutions of these oxides and lithium oxide have been examined from the aspect of their serving as oxygen electrode carriers. A relation between the hole-type conductivity of these oxides and lithium oxide and the chemisorption of oxygen on

Card 1/2

ACCESSION NR: AP4039614

their surface is given. It was shown that all factors leading to
a decrease in the elastic forces of the crystal lattice of these
oxides should lower the activation energy of electrical conductivity
and chemisorption. The rate of the current generating processes
on the oxygen electrode with a solid solution carrier of lithium
oxide and NiO, CoO, CuO, MnO etc. depends upon the hole concentration,
which is equivalent to the concentration of lithium. The electro-
chemical activity of the electrode increases with increased concen-
tration of lithium in the solid solution passing through a maximum.
The conclusions were confirmed experimentally. Orig. art. has: 17
formulas.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I.
Mechnikova (Odessa State University)

SUBMITTED: 20Mar63   DATE ACQ: 19Jun64   ENCL: 00

SUB CODE: GC   NO REF SOV: 005   OTHER: 004

Card 2/2

ACCESSION NR: AP4041755

S/0076/64/038/006/1594/1599

AUTHOR: Davtyan, O. K.

TITLE: Study of the mechanisms of oxidation, hydrogenation and electrochemical combustion on solid catalysts. XI. Potential of gas electrodes as a function of the nature of carrier

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 6, 1964, 1594-1599

TOPIC TAGS: fuel cell, electrochemistry, adsorption, gas electrode, electrode potential, catalysis, surface catalysis, chemical potential

ABSTRACT: The thermodynamically reversible potential of a gas electrode is determined by the maximum work of conversion of a given gas at a given pressure from the molecular state into electrolytic solution in the form of ions. These processes of hydrogen and oxygen electrodes may be represented as follows:

$$\tfrac{1}{2}H_2(g) \rightleftharpoons H^+(1) + e^-$$

$$\tfrac{1}{2}O_2(g) \rightleftharpoons O^{-2}(1) - 2e$$
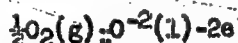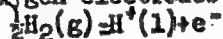
where g and 1 represent gaseous and ionic states respectively and thus for any gas

Card 1/3

ACCESSION NR: AP4041755

$$\varphi = \frac{1}{ZF} \Delta Z_{g \rightarrow 1} = \frac{1}{ZF} (\mu_g - \mu_1)$$

where $\Delta Z_{g \rightarrow 1} = Z_{(g)} - Z_{(1)}$ is the difference of the chemical potential of the system and μ is the chemical potential. The article considers the thermodynamic- ally reversible potential of gas electrodes as a function of the nature of the carrier in the absence of contact with the gaseous phase and also in the presence of contact between the electrode and the gaseous phase. If the gaseous electrode is in equilibrium with the gaseous phase its equilibrium potential is independent of the nature of the carrier electrode and it is only determined by the changes of chemical potential during transition of substance from gaseous to ionic state. In the absence of contact with gaseous phase the magnitude of potential, depending on the nature of the carrier, is basically determined by the free energy of chemi- sorption of the considered gas. The electrode potential is a function of the num- ber of active centers and their energy level only for electrodes with immobile chemisorbed layer in the absence of contact with the gaseous phase. In the general case the number of active centers and the extent of their activity determine only the kinetics of current producing processes. If the rate of these processes is very small these factors may also influence the electrode potential. The standard

Card   2/3

ACCESSION NR: AP4041755

free energy of chemisorption, which may be determined by the electrochemical methods, characterize the catalytic activity of the carrier electrode. Orig. art. has: 1 table and 23 equations.

ASSOCIATION: Odesskiy gosudarstvennyy universitet (Odessa State University)

SUBMITTED: 22Nov62   ENCL: 00

SUB CODE: GC   NO REF SOV: 002   OTHER: 001

Card   3/3

L 23897-65   FSS-2/EWT(1)/EWG(k)/EWT(m)/EPF(c)/EEC(k)-2/EPF(n)-2/T-2/T/
EED-2/FS(b)   Pz-6/Pr-4/Pu-4   RM/WW

ACCESSION NR: AP5002572   S/0076/64/038/012/2812/2818

AUTHOR: Davtyan, O. K.

TITLE: Mechanism and kinetics of current-generating processes in electrochemical gas combustion. 1. A working model of the porous structure and active surface of gas electrodes

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 12, 1964, 2812-2818

TOPIC TAGS: gas combustion, electrochemical combustion, current generation, gas electrode, electrode structure, electrode model

ABSTRACT: An approximate working model has been derived for the porous structure of gas electrodes to permit correlations between their structural parameters and experimental results. The model is based on previous studies and on assumptions of a continuous, interconnected and open pore structure, and of passage of capillaries through the electrode mass at an average angle of 45°. From these assumptions, and from the experimentally determined distribution function of pore radii, expressions are derived for the effective pore length and for the effective number of pore radii. The active pore surface, i.e. the locus

Card   1/3

L 23897-65
ACCESSION NR: AP5002572

of electrochemical reaction, is generated by the pressure gradient between gas and the liquid electrolyte at the intersection of flooded and non-flooded capillaries. Conditions for the formation of an active surface are analyzed and shown to involve three principal cases, i.e. completely wetted capillary surfaces, partially wetted capillary surfaces and a mobile chemisorbed gas layer, and partially wetted surfaces of capillaries and an immobile chemisorbed gas film. For the latter case, an expression has been derived which defines the active surface of gas electrodes

$$Q^* = \frac{\bar{n} S_i \, \Delta r_i \int_{r_0}^{r_0} S(r) \, dr}{1.4 \left[2.02\pi \int_0^r S(r) r \, dr \right]^{1/2}} \tag{1}$$

Card   2/3

L 23897-65

ACCESSION NR: AP5002572

$Q\#$ being a dimensionless parameter defining the active surface, $\int$ the thickness of the electrode, λ the average length of the meniscus in partially flooded capillaries, r the average pore radius, r_e a critical pore radius defining the degree of flooding, and $S(r)$ the distribution function of pore radii. Orig. art. has: 5 figures and 20 formulas.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I.I. Mechnikova (Odessa state university)

SUBMITTED: 24Aug63   ENCL: 00   SUB CODE: GC

NO REF SOV: 004   OTHER: 002

Card   3/3

L 49453-65   EPF(c)/EWT(m)/EWP(b)/EWA(d)/EWP(t)   IJP(c)   JW/JD/WB

ACCESSION NR: AP5009943   UR/0364/65/001/002/0207/0211

AUTHOR: Davtyan, O. K.; Thach, Yu. A.

TITLE: Mechanism of oxidation, hydrogenation and electrochemical combustion on solid catalysts. XIII. Study of the number of active charcoal centers as a function of the activation temperature

SOURCE: Elektrokhimiya, v. 1, no. 2, 1965, 207-211

TOPIC TAGS: charcoal, surface activity, electrochemistry

ABSTRACT: Different forms of carbon have a different number of surface-active centers depending on the pretreatment. The purpose of this work was to investigate one of the parameters which determine the surface activity, namely the activation temperature effect. A special device was designed and constructed for the investigation of electrodes made from powdered catalysts. The number of active centers was determined for different types of activated charcoals by the electrochemical method. The number of active centers calculated on the basis of anodic polarization data agrees quite well with the number obtained on the basis of cathodic polarization. The experimental anodic polarization data agree with the theoretical data

Card 1/3

L 49453-65
ACCESSION NR: AP5009943

based on calculations from previously derived equations relating electrode potential
to the number of active sites on the surface. The data on the number of active
centers in different types of charcoal, obtained from the experimental anodic and
cathodic polarization curves are shown in table 1 of the Enclosure. The results
show that the electrochemical method may be used for finding the number of active
centers on different objects. "The experimental work was carried out with the
participation of Ya. Sedlevskiy, Trainee from the Polish National Republic." Orig.
art. has: 3 figures and 1 table.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I. Mechnikova (Odessa
State University)

SUBMITTED: 11May64   ENCL: 01   SUB CODE: GC, IP

NO REF SOV: 006   OTHER: 002

C_d 2/3

L 35091-65   EWT(m)/EWD(m)/T/EWA(d)   RPL

ACCESSION NR: AP5006690   S/0076/65/039/002/0313/0320   14
                                                                       13
AUTHOR: Davtyan, O. K.   6

TITLE: Mechanism and kinetics of the current generating processes in the electro-
chemical combustion of gases. II. Active surface of gaseous electrodes

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 2, 1965, 313-320

TOPIC TAGS: active electrode surface, gas electrode, porous structure theory,
gas liquid pressure drop, pore surface distribution, current generation,
electrochemical combustion

ABSTRACT: In the preceding paper (Zh. fiz. khimii, 38, 2818, 1964), the author
studied a model of the porous structure of gaseous elements and their active
surface during incomplete wetting by the electrolyte. The present paper develops
the theory of porous structure further and extends it to the case of wetted and
nonwetted surfaces. Formulas are derived for calculating the active surface area
of electrodes in cases when the chemisorbed layer is stationary or mobile and in
cases when the electrode surface is completely or incompletely wetted by the
electrolyte. A method is proposed for calculating the mean length of the active
region of a liquid meniscus within capillaries. The optimum pressure drop between

Card 1/2

L 35093-65

ACCESSION NR: AP5006690

the gas and the liquid is determined from the conditions for a maximum active surface. According to calculations based on the experimental distribution curve of the surface relative to the capillary radii, the active surface has a maximum as a function of the radius corresponding to the equilibrium pressure drop. In all cases, this maximum represents approximately the maximum distribution of the pore surface. Orig. art. has: 24 formulas and 8 figures.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I. Mechnikova (Odessa state university)

SUBMITTED: 24Aug63   ENCL: 00   SUB CODE: GC

NO REF SOV: 006   OTHER: 000

Card 2/2

L 46984-65   EWP(k)/EWP(z)/EWP(m)/EWG(m)/EWP(b)/T/EWP(e)/EWP(t)   Pf-4/Pad IJP(c)
JD/RWH/HW

ACCESSION NR: AP5011467   UR/0076/65/039/004/0877/0883

AUTHOR: Davtyan, O.K.

TITLE: Study of the mechanism of oxidation, hydrogenation, and electrochemical combustion on solid catalysts. XII. Porous structure and optimum operating conditions of gas electrodes

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 4, 1965, 877-883

TOPIC TAGS: gas electrode, electrode structure, porous electrode, hydrogen electrode, nickel electrode, solid catalyst, mercury porometry

ABSTRACT: Mercury porometry was used to study the structure of hydrogen electrodes. A low-pressure porosimeter designed by the authors and a low and high pressure porosimeter were employed. The electrodes were made of pressed and sintered nickel powder; they were activated by soaking in 70% nickel nitrate and reducing in H_2 at 400C. Curves of the distribution of the pore surface versus the effective pore radii were plotted and found to go through a maximum, a Gaussian distribution being observed. Several maxima are possible for the same sample, depending upon its porous structure, the highest maximum being associated with fine pores. The optimum condition of operation of such electrodes is the establishment of the three-phase boundary, i.e., the immersion

Card 1/2

L 48984-65

ACCESSION NR: AP5011467

5

boundary, in the vicinity of the maximum of the distribution curve or beyond it, in the region of capillaries of smaller radii. It is concluded that spherical particles of the same size are most desirable in gas electrodes. "Yu. K. Epimakhov, E.G. Misyuk, I.I. Burshteyn and N.F. Semizorova took part in the experimental work." Orig. art. has: 6 figures and 5 formulas.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I.I. Mechnikova (Odessa State University)

SUBMITTED: 17Aug63   ENCL: 00   SUB CODE: GC

NO REF SOV: 003   OTHER: 001

Card 2/37nb

L 63567-65   EWT(m)/EPF(c)/EWG(m)/EWP(j)/T   Pc-4/Pr-4   RWH/WW/RM

ACCESSION NR: AP5013520

UR/0076/65/039/005/1098/1104

541.13:541.124/.128

AUTHOR: Davtyan, O. K.

TITLE: Kinetics and mechanism of current-producing processes in the electro-chemical combustion of gases. Part 3. Electrochemical kinetics

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 5, 1965, 1098-1104

TOPIC TAGS: electrode polarization, electrochemical process

ABSTRACT: On the basis of the theory of porous electrodes and the theory of ab-solute reaction rates, the authors examine the kinetics of electrode processes in-volving oxygen and hydrogen gases, independently of the ohmic potential drop of the electrode and of the diffusion processes. It was found that when the electrochemi-cal polarization (electrode polarization) η_e has low values, it is directly propor-tional to the current density. In the range of low gas pressures, the polarization should decrease sharply with increasing pressure; the change in η then becomes smoother and goes through a minimum. At high current densities, the electrochemical polarization is directly proportional to the log of the current density; η_e changes

Card 1/2

L 63567-65

ACCESSION NR: AP5013520

with the pressure in the same manner as in the case of low polarizations, but the relationship is logarithmic. The equations derived for the polarization η_c make it possible to determine the magnitude of the exchange current and the electro-chemical activity of the electrodes when the experimental values of the polarization are known. Orig. art. has: 42 equations.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I. I. Mechnikova (Odessa State University)

SUBMITTED: 28Nov63   ENCL: 00   SUB CODE: GC

NO REF SOV: 003   OTHER: 001

Card 2/2

L 58807-55   EPA/EWT(m)/EPE(k)/EPR/EWA(c)   Pr-4/Ps-4/Pt-7   WW/JW

ACCESSION NR: AP5015887   UR/0076/65/039/006/1338/1344
                                            541.13

AUTHOR: Davtyan, O. K.

TITLE: Kinetics and mechanism of current-producing processes in the electrochemical combustion of gases. Part 4. Electrode polarization caused by ohmic drop in the capillaries

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 6, 1965, 1338-1344

TOPIC TAGS: electrode polarization, electrochemical process, gas combustion, gas electrode

ABSTRACT: The polarization of gas electrodes, determined by the limited rate of some process, is associated with a potential drop due to the ohmic resistance of the electrolyte in the pores of the electrode, and the total polarization always has two components: the electrochemical (or concentration) polarization and the ohmic drop in the pores. It is shown that at very high current densities, the ohmic potential drop in the capillaries of the electrode increases with decreasing thickness of the electrode and increasing length of its active portion. The optimum electrode thickness was found to be 1-2 mm; below 1 mm, the polarization rises sharply, and above 2 mm, the polarization drop is

Card 1/2

L 58807-55

ACCESSION NR: AP5015587

very small. Polarization as a function of the effective length of the active portion of a capillary passes through a minimum. On this basis, the effective length of the capillary was determined as a function of the other parameters of the electrode. Orig. art. has: 6 figures and 27 formulas.

ASSOCIATION: Odesskiy gosudarstvennyy universitet im. I.I. Mechnikova (Odessa State University)

SUBMITTED: 25Nov63   ENCL: 00   SUB CODE: GC, ME

NO REF SOV: 003   OTHER: 001

Card 2/2

DAVTYAN, O.K.

Mechanism of oxidation, hydrogenation, and electrochemical combustion on solid catalysts. Part 10. Zhur. fiz. khim. 38 no.5:1077-1083 My '64.   (MIRA 18:12)

1. Odesskiy gosudarstvennyy universitet imeni Mechnikova. Submitted March 20, 1963.

DAVTYAN, O.K.; Prinimali uchastiye: EPIMAKHOV, Yu.K.; MISYUK, E.G.; BURSHTEYN, I.I.; SEMIZOROVA, N.F.

Mechanism of oxidation, hydrogenation, and electrochemical combustion on solid catalysts. Part 12. Zhur. fiz. khim. 39 no.4:877-883 Ap '65.   (MIRA 19:1)

1. Odesskiy gosudarstvennyy universitet imeni Mechnikova. Submitted Aug. 17, 1963.

L 38164-66   EWT(m)/EWP(j)/T   RM/DS

ACC NR: AP6019237   (A)   SOURCE CODE: UR/0364/66/002/003/0311/0318

AUTHOR: Misyuk, E. G.; Davtyan, O. K.; Sofronkov, A. N.; Uminskiy, M. V.

ORG: Odessa State University im. I. I. Mechnikov (Odesskiy gosudarstvennyy universitet)

TITLE: A study of electrode semiconducting catalyzers

SOURCE: Elektrokhimiya, v. 2, no. 3, 1966, 311-318

TOPIC TAGS: electrode, semiconductor catalyst, lithium, nickel, oxide, electrochemistry, electric conductivity, defect structure, temperature dependence, lattice parameter, solid solution, activation energy, chemisorption

ABSTRACT: The effect of fluctuations in hole concentration on electroconductivity, lattice parameters and activation energies was studied in solid solutions of $Li_xNi_{(1-x)}O$. Equations are derived for the desorption and chemisorption of oxygen in $Li_xNi_{(1-x)}O$, and for the formation of hole complexes essential to semiconducting oxides. The above oxides were formed by reacting nickel and lithium carbonates with acetic acid and decomposing the resulting acetates in air at 600°C. In this way, oxide mixtures containing 10, 20, 30, 40 and 50 at % lithium were produced. The solid solutions were produced by heating the mixtures at 700, 800, 1000 and 1200°C. The concentration of Ni^{3+}, Li_2O and Li in the solid solutions are given for various Li starting concentrations ($[Li^+]_0$) and reaction temperatures. Lattice parameters varied linearly with

Card 1/2   UDC: 541.135.52-44

L 38164-66

ACC NR: AP6019237

formation temperature from 4.16 $\overset{o}{A}$ at 700°C to 4.18 $\overset{o}{A}$ at 1000°C. Electrical conductivity (σ), $[Ni^{3+}]$ content and $\sigma/[Ni^{3+}]$ are given as a function of formation temperature for test temperatures ranging from 20 to 500°C. Maxima always occurred at 900°C (formation temperature) and the maxima was found to increase with test temperature. Maxima also occurred for $[Ni^{3+}]$, plotted as a function of $[Li^{+}]_0$ at $[Li^{+}]_0$ = 30%. Activation energies calculated for $[Li^{+}]_0$ = 20% ranged from 0.83 to 4.37 kcal/mol depending on the formation and test temperatures. The electrical conductivity depended on the activation energy, lattice parameter and jump frequency of the transition holes; thus it possessed an electron hole nature as well as an ionic one. The latter was the cause of hole complex dissociation and the dissociation of "inert" interstitial lithium oxides into ions. Orig. art. has: 6 figures, 2 tables, 10 formulas.

SUB CODE: 07,11/ SUBM DATE: 01Feb65/ ORIG REF: 004/ OTH REF: 006

Card 2/2 mLP

L 42159-66   EWP(j)/EWT(m)/T/EWP(t)/ETI   IJP(c)   RM/DS/JW/JD/JG

ACC NR: AP6022425   (A)   SOURCE CODE: UR/0364/66/002/004/0451/0456

AUTHOR: Misyuk, E. G.; Davtyan, O. K.; Uminskiy, M. V.

ORG: Odessa State University imeni I. I. Mechnikov (Odesskiy gosudarstvennyy universitet)

TITLE: Study of semiconductor electrode catalysts. Part 2: Dependence of the hole concentration and electrical conductivity of $Li_xCu_{(1-x)}O$ solid solutions on the conditions of their formation

SOURCE: Elektrokhimiya, v. 2., no. 4, 1966, 451-456

TOPIC TAGS: lithium oxide, copper compound, solid solution, hole conduction, HEAT OF FORMATION, SEMICONDUCTOR CONDUCTIVITY

ABSTRACT: $Li_xCu_{(1-x)}O$ solid solutions with hole conduction, containing 10, 20, 30, 40, and 50 at. % lithium, were studied. A marked dependence of the hole concentration on the temperature of formation of the solid solution and on the initial lithium concentration was noted. Under optimum conditions, 5.6 at. % lithium becomes incorporated in the solid solution. The difference in the maximum incorporation of Li_2O in NiO and CuO is explained by the close similarity of the NiO and Li_2O lattices. The value of $\sigma/[Cu^{3+}]$ was calculated from electrical conductivity data, and found to increase in regular fashion with rising temperature of formation of the solid solution. In the range of 25-500°, the linear relationships $\log \sigma$, $1/T$ do not show any inflections, but this must not be construed to indicate the absence of mobile charges of different char-

UDC: 541.135.4

Card 1/2

L 42159-66

ACC NR: AP6022425

acter. Both hole and ionic conduction should take place in these solid solutions; however, it is impossible to distinguish these two types of conduction on the basis of the temperature dependence, since their activation energies are nearly the same. Orig. art. has: 8 figures and 3 tables.

SUB CODE: 07,20/ SUBM DATE: 01Feb65/ ORIG REF: 002/ OTH REF: 002

Card 2/2